

DISPLAY DEVICE AND METHOD THEREFOR

BACKGROUND

Reference to Related Applications

- 5 [1001] The present invention is a Continuation-in-Part Patent Application of prior Patent Application No. 09/260,426, entitled "DISPLAY DEVICE AND METHOD THEREFOR."

Field

- 10 [1002] The present invention relates to display devices and specifically to automotive display devices.

Background

- 15 [1003] Automobile displays are often used to express feelings, alliances, political preferences, and to support sports teams, local organizations, as well as any number of expressions. Traditional methods of display include bumper stickers, license plate frames, suction cup displays, antenna flags, rear view mirror ornaments, hood ornaments, and many others. Each of these methods of expression has drawbacks.

- 20 [1004] Bumper stickers, decals, and other stickers require adhesive that is difficult to remove without damaging the paint on the car. Bumper stickers are effectively a permanent expression pasted to the car for as long as you own the car. As time goes by, the bumper sticker ages and eventually may become illegible, while the remnants of the bumper sticker remain visible. Bumper
25 stickers are not easily changed, as either a new one must be placed exactly over the old one, or one must scrape the old one off prior to placing the new one.

- [1005] The license plate frames have a very limited space for text or graphic display and are usually only visible from immediately in front of the license plate.
30 These are difficult to change, usually requiring several screws and are not easily removed. When the license plate frame is larger, it often impairs the visibility of the license plate itself.

5

10

BRIEF DESCRIPTION OF THE DRAWINGS

15

[1009] Figs. 2-3 illustrate a display device according to one embodiment of the present invention.

20

[1011] Figs. 7-8 illustrate portions of a display device according to one embodiment of the present invention.

[1012] Fig. 9 illustrates a tailpipe according to one embodiment of the present invention.

25

[1014] Fig. 11 illustrates a portion of an engagement means according to one embodiment of the present invention.

30

[1016] Figs. 15-17 illustrate a lighted display device according to one embodiment of the present invention.

[1021] Figs. 25-27 illustrate display apparatus according to various
10 embodiments of the present invention.

[1026] According to one aspect of the present invention, a hinge includes a first portion having a first interface portion, a second portion having a second

interface portion, wherein the second interface portion is adapted to interface with the first interface portion, the second interface portion and the first interface portion adapted to couple the first portion to the second portion, the second portion having a flange which interacts with the first portion so as to allow
 5 freedom of rotation in a first direction with respect to the first portion, and limit rotation in a reverse direction with respect to the first portion, and an interface piece adapted to secure the first and second portions when the first and second interface portions are coupled.

[1027] According to one embodiment of the present invention, a pollution
 10 detection device includes a tailpipe attachment piece, adapted for coupling to the exhaust pipe of a vehicle, a receiver piece coupled to the tailpipe attachment piece, and a chemical indicator coupled to the receiver piece, wherein the chemical indicator is sensitive to the chemistry of emissions. The detection device could determine an oxygen ratio in the emissions, or carbon
 15 monoxide or nitrogen oxides, or any other chemical. It is also possible to detect

[1028] Additionally, it is possible to monitor the temperature of the exhaust emissions from the display device, providing a warning to the operator of potential problems with the catalytic converter or other problems in the emissions system. This is particularly desirable where the vehicle is driven
 20 through grass, or other flammable materials. Further, vibrational detectors may be placed within proximity of the tailpipe to allow detection of potential problems with the muffler or exhaust system. The indication may be a color change in the display article, such as a dot in the upper corner. Further the signal may be provided as feedback to the operator of the vehicle or technician working on the
 25 vehicle.

[1029] One embodiment of the present invention is the Exhaust Etiquette, TailRings device, having an adjustable engagement ring, a hinge which restricts rotation in one direction and has replaceable display articles.

[1030] As illustrated in Fig. 1, display device 12 is attached to vehicle 5 and
 30 is positioned around tailpipe 10. Display device 12 includes a display article 18, which allows display of information, insignia, college name, logo, etc. The display article 18 does not interfere with view of the license plate 7 and does not obstruct the view from any windows in the vehicle 5, such as through window 8.

The display device 12 of Fig. 1 is further illustrated in Fig. 2, including display article 18.

[1031] Many of the benefits of the present invention are illustrated in Fig. 1, where the display article is positioned under the vehicle and is thus protected from the elements, such as rain, sleet, dust, wind, etc. The vehicle acts as an umbrella over the display article. Similarly, the display article is below the exhaust pipe, and therefore is not in the path of exhaust gases. Additionally, the display article is easily visible from behind the vehicle, allowing full expression. The display article does not interfere with the view of the vehicle operator, and is not intrusive to operation of the vehicle.

[1032] The position of the display device is particularly applicable to sensors and safety type devices, which provide information about the rear of the vehicle. The display device provides a convenient place to warn other drivers, such as that children are in the vehicle.

[1033] Fig. 3 illustrates one embodiment of display device 12, including an engagement ring 24, which has a round shape adapted to accommodate an exhaust pipe or tailpipe of a vehicle. Display device 12 further includes a latch 22 for positioning the display device 12 on the tailpipe, for removing the display device 12 from the tailpipe, and positioning and securing the display device 12 on the tailpipe. Latch 22 may be a mechanical locking device for securing the two sides of engagement means 24, or may be a slide connector, or any other device which secures the engagement ring 24 to a size sufficient to hold to the tailpipe. Engagement ring 24 is also coupled to connectors 27, 28, and 30. Connector 30 is then coupled to the display article 26. According to one embodiment, connector 27 is fixedly attached to the engagement ring 24, while connector 28 is easily removed or inserted into both connector 27 and connector 30. When connector 28 is removed, connector 27 is decoupled from connector 30, and engagement ring 24 from display article 26.

[1034] Engagement ring 24 will typically fit snugly to the tailpipe so that the display device 12 remains attached to the tailpipe, and so that the display article 26 may be read accurately. Note that alternate embodiments may have engagement rings that slide around the tailpipe, effecting a visual, dynamic display. This is the case of children's animals, spiral shapes, etc., where the

display article moves either back and forth or around the tailpipe. In one embodiment, two children are on a see-saw, and move back and forth with the movement of the vehicle. In another embodiment, a spherical pattern is formed as the display article rotates around the tailpipe.

- 5 **[1035]** Fig. 4 illustrates portions of display device 12, where connector 16 has an protruding portion 15. Connector 13 is typically fixedly attached to an engagement rung, such as ring 24. Connector 13 is adapted to couple to connector 16, and pin 14 is adapted to secure this coupling. When connector 13 is coupled to connector 16 and secured by pin 14, the combination acts as a
- 10 hinge. Such a hinge operation restrains movement in one rotational direction, illustrated in Fig. 4 as counterclockwise direction. As the display article hangs from the tailpipe, it is desirable to prevent the display article from rotating outward, away from the vehicle to maintain a readable display. Further, according to one embodiment, illustrated in Fig. 4, the display article is allowed
- 15 to rotate toward the vehicle to allow for accidental contact with other objects. This is the case if the vehicle reverses into an obstacle, or it hit by another vehicle or object. Considering connector 13 stationary with respect to an engagement ring, connector 16 rotates counterclockwise until protruding portion 15 meets connector 13, thus prohibiting further movement.
- 20 **[1036]** As illustrated in Figs. 4 and 5, connector 16 has two rounded portions which form a longitudinal hole. The two rounded portions of connector 16 mate with the single rounded portion of connector 13, illustrated in Fig. 6. According to this embodiment, the protruding portion 15 of connector 16 is located between the two rounded portions. Alternate embodiments may have only one
- 25 rounded portion, or may have multiple rounded portions, and/or multiple protruding portions. Still alternate embodiments may employ alternate shapes, such as square, or rectangular, or octagonal, which allow incremental rotations. Some embodiments may not allow movement, and only provide joint operation of the combination of connector 16 and connector 13. Note that alternate
- 30 embodiments may employ other means of coupling the engagement ring to the display article which employ a one piece unit. As illustrated in Fig. 6, connector 13 is adapted for coupling to the engagement ring. A one piece unit may be implemented in the tailpipe or within the muffler, wherein the display device or a

portion of the display device is formed molded or otherwise constructed as a part of the tailpipe and/or muffler. For example, the display device may be molded into the tailpipe and/or muffler during manufacture of the tailpipe and/or muffler. The display device may therefore be an integral part of the tailpipe and/or muffler, and may include the display article.

5 [1037] Two views of the display device attached to a vehicle are provided in Figs. 7 and 8, where Fig. 7 is a back view, and Fig. 8 is a front view. Note that the front view of Fig. 8 is observed from behind the vehicle, while view Fig. 7 is not readily available from behind the vehicle. As illustrated in Fig. 7, display article 18 is attached to connector 16 via screws 17, but may be any attachment means, including an adhesive element, interlocking tape, a magnetic element, or any other means of coupling display article 18 to connector 16. Note that display article 18 is coupled to connector 16 which is mated with connector 13, and connector 13 is coupled to engagement ring 12. In this way, the display article may rotate toward the viewer. Fig. 8 illustrates the front view as seen from behind the vehicle, where a university insignia is displayed from the display article 18. While screws 17 are not shown in Fig. 8, they may be visible. Here the protruding portion 15 of connector 16 is lying flat against connector 13.

15 [1038] Fig. 9 illustrates a display device incorporated into a tailpipe. Here a connector 32 couples the tailpipe to the display article. Note that the connector may be a single piece with the tailpipe, or may be a separate piece fixedly attached to the tailpipe, or may be detachable and/replaceable from the tailpipe. In one embodiment, the display device may be a one-piece unit without distinguishing parts. According to one embodiment, the display article is detachable and replaceable. According to an alternate embodiment, the display device and display article are one unit and are not separable.

20 [1039] The display device of one embodiment adapts to fit a variety of tailpipe sizes, shapes, and configurations. As illustrated in Fig. 10, engagement ring 34 is fits around a double tailpipe. Engagement ring 34 is coupled to connectors 36 and 38, which couple display article 40 and engagement ring 34. Note that the engagement ring 34 may be an adjustable ring or may be custom sized to adapt to a particular size tailpipe, tailpipe configuration, make and model of car, etc.

[1040] An adjustable engagement ring 42 is illustrated in Fig. 42, where a clip 44 adjusts the ring 42 to accommodate a tailpipe. Note that the excess section 45 may be eliminated from the ring 42. Ring 42 may be a durable plastic, such a thermal resist material, or may be a rubber, a metal, or may be a stretch resistant material, such as timing belt materials, etc. It is desirable that the material resist melting, resist heat deformity, resist stretching, resist cracking, etc. It is further desirable that the material be a non-skid type material to prevent sliding off the tailpipe.

[1041] In one embodiment, the present invention employs a molded plastic engagement means with a zip tie cord, which locks when inserted. According to another embodiment, a snap closing forms a watch band clasp type of connection, and may be made of molded plastic, leather, flexible mesh metal, ribbon, rubber, nylon, neoprene or reinforced rubber, tin, copper, brass, ceramics, interlocking tape or other material. The present invention may be implemented using a heat resistant rubber, or a nonheat resistant rubber, as the tailpipe of most cars does not experience great temperature variations. Similarly, the present invention may be implemented with, or contain pieces or components implemented with, a durable plastic or molded plastic bands. Note that according to one embodiment, a stainless steel band is provided with a clasp type closure. According to still another embodiment, an aluminum or chrome engagement mechanism is provided having a watch clasp type closure.

[1042] A truck is illustrated in Fig. 12, having a tailpipe 50 that extends parallel to the back of the truck bed. Engagement ring 52 is adjusted for the size and shape of such a tailpipe, and attachment piece 53 allows the display article 52 to hang visibly from the truck. Attachment piece 53 includes an adjustment, which allows the display article 52 to be so positioned. Similarly, in Fig. 13, a transport vehicle is illustrated having an exhaust pipe next to the cab portion of the vehicle. An engagement ring 56 is adapted to the increased size and distinct shape of the exhaust pipe. Again an attachment piece 58 allows the display article 60 to hang visibly. Here the attachment piece 58 may allow rotation of the display article, and may include an adjustment for determining which way display article 60 will be viewed. Still further, display article 60 may be double sided, allowing views from in front and behind the exhaust pipe.

5

10

25

30

positions, such as those illustrated in Fig. 18. In one embodiment, a small microcontroller is positioned on the back side of the display article to provide pulsing lights.

- [1047]** Still further embodiments incorporate other lighted displays, such as a liquid crystal diode (LCD) display, light emitting diode (LED), or other display, where the information is easily changed. As illustrated in Fig. 19, a display article 79 includes a lighted display portion 80, where the number “33” are displayed in a front view. A back view is illustrated in Fig. 20, where again electrical power is provided from the automotive system via conductors 78.
- Controller 83 is coupled to conductors 78 and to lighted display portion 80; controller 83 turns on when power is supplied to conductors 78 and turns off when power is terminated. The lighted display portion may provide a digital output, such as a ticker tape symbol, or message. Controller 83 includes a memory portion for storing the message(s) to be displayed. In one embodiment, a graphic image is displayed with requires additional memory, wherein the memory can be replaced to change the image. In this way, it is possible to display video information from the display article. Similarly, in one embodiment, a central controller is provided within the vehicle, allowing the operator to input a message to be displayed from the display article.
- [1048]** Although the display article illustrated in Fig. 1 is a square shape, similar to a small license plate, display articles may be any shape. For example, one display article illustrated in Fig. 14, is shaped like a football helmet. Within the scope of the present invention, any information that is displayed by way of bumper stickers, license plate frames, window stickers and decals, flags, antenna displays, etc. may be easily and effectively displayed using the display device. Further, the display device adds needed flexibility to the vehicle by providing a convenient place for chemical sensing of exhaust, provision of information regarding the rear of the vehicle, as well as providing a means for the operator to provide information to other vehicles.
- [1049]** According to one embodiment of the present invention, the display article is composed of a material sensitive to vehicular emission chemistry, and provides an indication of the level of various components within the emission chemistry. For example, a material sensitive to pollutants indicates when

pollutants are over a predetermined level. In one embodiment, this indication is to change color. In another embodiment, a gauge 90 is provided, as illustrated in Fig. 21, which provides a continuous emissions check. In still an alternate embodiment, illustrated in Fig. 22, display article 100 provides an indication of the emission chemistry of the vehicle, where a sensor 99 is coupled to display article 100. Sensor 99 is positioned in the path of a portion of the emission gases. As the gases pass the sensor, if the chemical content of the emission is above a predetermined threshold, a chemical reaction occurs causing the display article 100 to indicate the result.

10 **[1050]** Various locking mechanisms are illustrated in Figs. 23-24. Locking mechanisms may be implemented to secure the engagement means to the tailpipe, and/or may be implemented to secure the display article to the engagement means. One embodiment, illustrated in Fig. 23, provides a locking tab 106 on the display article, or on a coupling means. The locking tab
15 106 is mated to a slot 108 positioned on either the coupling means or the engagement means 102. The tab 106 fits into the slot 108 in one direction by compressing the locking tab 106 to fit within the slot 108. When fully inserted, the tab 106 is released and locks in place, thus securing the connection. The tab 106 is released by placing pressure on the tab 106 and removing the tab
20 106 from slot 108.

[1051] Fig. 24 illustrates a locking device positioned on the engagement means, which secures the engagement means to the tailpipe. This is particularly useful where the entire device is a single piece, as a molded plastic device. This lock may be any mechanism which secures the engagement
25 means to the tailpipe, including the locking means discussed with respect to Fig. 23.

[1052] According to one embodiment, the display device is provided with a global positioning device receiver, which is easily mounted and located. In one embodiment, a global positioning system includes a plurality of check points.
30 The checkpoints provide a control signal to activate the global positioning device on the display device. The checkpoints could be positioned at intersections and on major highways, as well as along rural stretches of road. The vehicle operator enables the device to determine a present location. Note

[1053] The display article may include a weather sensor which warns the operator of impending rain, or other condition based on atmospheric conditions.

10 **[1054]** In one embodiment, a sensor placed on the display device is coupled to the alarm system of the vehicle, and provides added protection of the vehicle.

15 The device is easily attached by the dealership and is easily removed prior to sale, as it may be replaced by advertisement for the dealership. The position of the device protects the information from the elements. Particularly in large inventory vehicle dealers, it is possible to quickly read the codes passing the rear of each vehicle.

[1057] The present invention provides a means of easily presenting an advertisement message. In this way, an advertisement may be easily attached to the tailpipe. The message is detachable, and changeable with a simple coupling mechanism. It is further possible to apply a locking mechanism to any of these applications and thus prevent loss or fraud. In this way, an advertiser has access to the viewers of the display article without interfering with operation of the vehicle.

5

[1059] According to one embodiment, an extension goes onto the muffler for an aesthetic effect having a display device attached thereto. Wherein the display device is positioned with the positioning of the extension.

10

15

20

25

30

[1061] Note that the connector 206 in one embodiment is a flexible piece that allows placement of the display portion 200 in a multi-directional environment.

[1062] FIG. 26 illustrates in detail the constituent parts of a display apparatus according to one embodiment. As illustrated, a display portion 300 includes a flat surface 302 for displaying a display article, and a ball connector 301. The ball connector 301 coupled to a socket ring 304 within which the ball connector 301 may be directionally placed and secured. The ball connector 301 couples to the socket ring 304 and tightens into place. The display portion 300 may then be placed into any one of a number of multiple positions. The socket ring 304 couples to a shaft 306. The socket ring 304 fits over the shaft 306 which may be a threaded shaft. A second ring 308 fits on the other end of the shaft 306. The second ring 308 then coupled to a tailpipe attachment piece 310 including a ball connector 312. FIG. 27 illustrates another view of the apparatus of FIG. 26.

[1064] Thus it is apparent that there has been provided, in accordance with the present invention, a display device, wherein the display device is for presenting a display from an exhaust pipe. Although the invention has been described and illustrated with reference to specific embodiments thereof, it is not intended that the invention be limited to these illustrative embodiments. Those skilled in the art will recognize that modifications and variations can be made without departing from the spirit of the invention. Therefore, it is intended that this invention encompass all such variations and modifications as fall within the scope as disclosed in the claims.

second ring 308 then coupled to a tailpipe attachment piece 310 including a ball connector 312. FIG. 27 illustrates another view of the apparatus of FIG. 26.

[1063] Alternate embodiments may implement a variety of connection means for attaching the tailpipe attachment piece to the tailpipe. Similarly, a variety of connection means are possible for coupling the tailpipe display piece to the tailpipe attachment piece.

[1064] Thus it is apparent that there has been provided, in accordance with the present invention, a display device, wherein the display device is for presenting a display from an exhaust pipe. Although the invention has been described and illustrated with reference to specific embodiments thereof, it is not intended that the invention be limited to these illustrative embodiments. Those skilled in the art will recognize that modifications and variations can be made without departing from the spirit of the invention. Therefore, it is intended that this invention encompass all such variations and modifications as fall within the scope as disclosed in the claims.

[1065] Thus, a novel and improved display device has been described. Those of skill in the art would understand that the data, instructions, commands, information, signals, bits, symbols, and chips that may be referenced throughout the above description are advantageously represented by voltages, currents, electromagnetic waves, magnetic fields or particles, optical fields or particles, or any combination thereof. Those of skill would further appreciate that the various illustrative logical blocks, modules, circuits, and algorithm steps described in connection with the embodiments disclosed herein may be implemented as electronic hardware, computer software, or combinations of both. The various illustrative components, blocks, modules, circuits, and steps have been described generally in terms of their functionality. Whether the functionality is implemented as hardware or software depends upon the particular application and design constraints imposed on the overall system. Skilled artisans recognize the interchangeability of hardware and software under these circumstances, and how best to implement the described functionality for each particular application. As examples, the various illustrative logical blocks, modules, circuits, and algorithm

steps described in connection with the embodiments disclosed herein may be implemented or performed with a digital signal processor (DSP), an application specific integrated circuit (ASIC), a field programmable gate array (FPGA) or other programmable logic device, discrete gate or transistor logic, discrete hardware components such as, e.g., registers and FIFO, a processor executing a set of firmware instructions, any conventional programmable software module and a processor, or any combination thereof designed to perform the functions described herein. The processor may advantageously be a microprocessor, but in the alternative, the processor may be any conventional processor, controller, microcontroller, programmable logic device, array of logic elements, or state machine. The software module could reside in RAM memory, flash memory, ROM memory, EPROM memory, EEPROM memory, registers, hard disk, a removable disk, a CD-ROM, or any other form of storage medium known in the art. An exemplary processor is advantageously coupled to the storage medium so as to read information from, and write information to, the storage medium. In the alternative, the storage medium may be integral to the processor. The processor and the storage medium may reside in an ASIC. The ASIC may reside in a telephone or other user terminal. In the alternative, the processor and the storage medium may reside in a telephone or other user terminal. The processor may be implemented as a combination of a DSP and a microprocessor, or as two microprocessors in conjunction with a DSP core, etc.

[1066] It would be apparent to one of ordinary skill in the art, however, that numerous alterations may be made to the embodiments herein disclosed without departing from the spirit or scope of the invention. The previous description of the preferred embodiments is provided to enable any person skilled in the art to make or use the present invention. The various modifications to these embodiments will be readily apparent to those skilled in the art, and the generic principles defined herein may be applied to other embodiments without the use of the inventive faculty. Thus, the present invention is not intended to be limited to the embodiments shown herein but is to be accorded the widest scope consistent with the principles and novel features disclosed herein.